Math 3 Unit 3

**Objective**: To identify end behavior of polynomial functions algebraically and graphically.

|  |  |  |  |
| --- | --- | --- | --- |
| **Degree of Polynomial**  | **Leading Coefficient**  | **Graphically**  | **Description**  |
| **Even** | **Positive** |  | $f\left(x\right)\rightarrow +\infty $$f\left(x\right)\rightarrow +\infty $$x\rightarrow -\infty $$x\rightarrow +\infty $ |
| **Even** | **Negative** |  | $f\left(x\right)\rightarrow -\infty $$f\left(x\right)\rightarrow -\infty $$x\rightarrow -\infty $$x\rightarrow +\infty $ |
| **Odd** | **Positive** |  | $f\left(x\right)\rightarrow -\infty $$f\left(x\right)\rightarrow +\infty $$x\rightarrow -\infty $$x\rightarrow +\infty $ |
| **Odd** | **Negative** |  | $f\left(x\right)\rightarrow +\infty $$f\left(x\right)\rightarrow -\infty $$x\rightarrow -\infty $$x\rightarrow +\infty $ |

**Describe the degree and leading coefficient of the polynomial function. Then describe the end behavior of the graph.**

1) $f\left(x\right)=x^{4}-2x^{2}+1$

The degree is \_\_\_\_\_\_\_\_\_ and the leading coefficient is \_\_\_\_\_\_\_\_\_.

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow -\infty $

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow +\infty $

2) $f\left(x\right)=-x^{3}-7x-6$

The degree is \_\_\_\_\_\_\_\_\_ and the leading coefficient is \_\_\_\_\_\_\_\_\_.

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow -\infty $

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow +\infty $

3) $f\left(x\right)=-3x^{6}+5x^{3}-7x+3$

The degree is \_\_\_\_\_\_\_\_\_ and the leading coefficient is \_\_\_\_\_\_\_\_\_.

$f\left(x\right)\rightarrow $ \_\_\_\_\_\_

$x\rightarrow -\infty $

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow +\infty $

4) $f\left(x\right)=x^{11}+5$

The degree is \_\_\_\_\_\_\_\_\_ and the leading coefficient is \_\_\_\_\_\_\_\_\_.

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow -\infty $

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow +\infty $

**Describe the end behavior of the graph. Then describe the degree and leading coefficient of the polynomial function.**

5)

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_** $f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow +\infty $ $x\rightarrow -\infty $

The degree is \_\_\_\_\_\_\_\_\_ and the leading coefficient is \_\_\_\_\_\_\_\_\_.



6)

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_** $f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow +\infty $ $x\rightarrow -\infty $

The degree is \_\_\_\_\_\_\_\_\_ and the leading coefficient is \_\_\_\_\_\_\_\_\_.

7)

$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_** $f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow +\infty $ $x\rightarrow -\infty $

The degree is \_\_\_\_\_\_\_\_\_ and the leading coefficient is \_\_\_\_\_\_\_\_\_.

8)



$f\left(x\right)\rightarrow $ **\_\_\_\_\_\_** $f\left(x\right)\rightarrow $ **\_\_\_\_\_\_**

$x\rightarrow +\infty $ $x\rightarrow -\infty $

The degree is \_\_\_\_\_\_\_\_\_ and the leading coefficient is \_\_\_\_\_\_\_\_.

**Use what you know about end behavior to match the polynomial function with its graph.**

9) $f\left(x\right)=2x^{4}+2x-1$

10) $f\left(x\right)=2x^{2}+2x-1$

11) $f\left(x\right)=2x^{3}+x^{2}-1$

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